

Bunker Hill Mill (Cline and Chapman Roller Mill)
Bunker Hill vicinity
Berkeley County
West Virginia

HAER No. WV-29

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
U. S. Department of the Interior
P. O. Box 37127
Washington, D. C. 20013-7127

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HISTORIC AMERICAN ENGINEERING RECORD

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(Cline and Chapman Roller Mill)

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Location: On County Route 26, 0.8 miles east of Bunker Hill,
Berkeley County, West Virginia

UTM: 17.755060.4357370
Quad: Inwood

Date of Construction: circa 1735. Rebuilt in 1887 after a fire destroyed
the interior of the building and left only the stone
walls standing.

Present Owner: Paul and Janita Giles, Bunker Hill, West Virginia

Present Use: The mill ceased commercial operation in 1964. The
water wheels and a majority of the mill's machinery
are operable.

Significance: One of the first and only surviving Mill Creek
(Berkeley County, West Virginia) grist mill. The mill
is equipped with tandem steel overshot water wheels.
The arrangement and variety of operable milling
machinery reveals the operation of a typical, small,
water-powered commercial grist mill in the early
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GENERAL HISTORY

As many as 13 grist and saw mills once operated along Mill Creek near Bunker Hill, West Virginia. At the site of the Bunker Hill Mill, water power was used to grind flour from 1735 until 1964 making it are of the oldest mills along the creek. At presnet, the Bunker Hill Mill is the sole surviving Mill Creek mill (see HAER photos W-29-2, 3, 4, and 5). [1]

The original mill was built by Thomas Anderson who had migrated from New York in 1735 after acquiring 542 acres of land along Mill Creek. Three years later Anderson sold the mill and 271 acres of adjacent land to his son Colbert. The mill property remained in the Anderson family until 1804 when Colbert Anderson Jr. exchanged the mill and 32 acres of adjoining property for 2,131 acres of Kentucky farmland. [2]

After leaving the Anderson family, the mill passed through the hands of a succession of different owners. The major change to the mill property was the addition of a large brick residence built by owner Alfred Ross in 1851. [3] At the time Ross owned the property, his mill was one of 13 water-powered grist or saw mills located along Mill Creek. [4] In 1856, Ross, deeply in debt, was forced to sell the mill and the adjacent acreage. Samuel Matthews and Henry Zollickoffer bought the property and engaged George T. Legg to operate the mill. [5] Legg ran the mill with the assistance of one or, on infrequent occasions, two mill hands. Mill help received 75 cents for a full 12 hour day and earned \$200 if employed for the full year. [6]

Under a 17 foot head, the mill's tandem overshot water wheels produced a total of 30 horsepower when turning at six rpm. As many as 300 bushels of wheat could be ground into flour in a single full day. Normal flour grinding required running the wheat through the stones (see photo HAER WV-29-22) three times. Three-quarters of the mill's output was flour for the commercial market, the remaining quarter being custom grinding for local farmers. Between June 1, 1879 and May 31, 1880, for example, Legg and his helper ground 22,000 bushels of wheat, valued at \$19,800, into approximately 4,000 barrels of flour. The mill also ground 1,000 bushels of rye and barley, produced 54,000 pounds (27 tons) of corn meal, and mixed 332,000 pounds (166 tons) of livestock feed. The total value of the mill's output was \$25,790. With raw grain valued at \$20,200, the mill's owners were left with \$5,590 to pay wages, buy mill supplies, and purchase and maintain the mill's diverse stock of machinery. [7]

Despite all of this activity the mill did not operate full time all year. Nine months of the year the mill operated at three-fourths of capacity and during three months the mill worked at only 50 percent of capacity. [8] As a commercial mill, the inability to operate at full capacity throughout the year contributed to the financial difficulties experienced by the mill's numerous owners; the frequent changes in ownership attest to the difficulties of keeping the mill profitable. For example, Legg purchased the mill from Matthews and Zollickoffer in June 1881 but sold it a mere three months later. [9] On three occasions the mill was sold as a result of a Chancery Court order. [10] Other Mill Creek millers must have experienced similar financial difficulties

because by 1880 only four other grist mills, all doing custom grinding for local farmers, still operated on Mill Creek. One of those four mills, like the Legg mill, was powered by tandem water wheels. [11]

In 1887, a fire destroyed the building, leaving only the stone walls standing. The Martinsburg Statesman reported: "The flames are said to be the largest ever seen in this place. The ruin is visited daily by large numbers." [12] By November of the same year, however, the mill was almost completely rebuilt and being readied for the resumption of operations under the supervision of miller Legg. [13]

After the mill was sold once again in 1888, it changed hands twice before being acquired by Samuel S. Cline in 1906. Cline employed James Chapman as his miller at a wage, in 1910, of \$400 per year. From 1910 until 1921, when Chapman purchased the property, the mill was known as the Cline and Chapman Roller Mill. During this time period the mill ground wheat into flour for the commercial market; processed oats, rye, and barley; ground and cracked corn; and mixed animal feed. Additional income came from the sale of seed wheat, apple cider, pigs, shingles and planks cut at the mill, coal, and water cress grown in the mill pond. Cash, a percentage of the grain ground into flour, and fruits and berries were all accepted as payment for the products and services sold by Cline and Chapman. On one occasion, a dentist extracted a tooth in exchange for flour. [14]

The increased demand for flour during World War I brought orders from merchants as far away as Philadelphia and Pittsburgh. [15] Flour destined for markets outside of the Martinsburg area was carted to the Cumberland Valley Railroad line running through the village of Bunker Hill (see photo HAER WV-29-1). [16] Business was conducted from the small office on the first floor where the mill's only source of heat, a coal stove, was located (see photos HAER WV-29-17 and 20).

Despite the mill's small size, lack of a railroad siding, and frequent changes in ownership, it operated until 1964. In 1971, the mill was sold to its present owners, Paul and Janita Giles. [17]

TECHNICAL DESCRIPTION

The water which powered the tandem overshot wheels of the Bunker Hill Mill was drawn from Mill Creek, a spring fed tributary of Opequon Creek. A dam on Mill Creek immediately downstream from the tail-race of another mill [18] diverted water into a supply canal emptying into the mill's forebay. Between the mill pond and the water wheel header box, water traveled through a stone-lined headrace (see Figure 3). Currently a concrete pipe conduit serves as the headrace. Above and between the two water wheels is a single rectangular steel header box with an individual water chute for each wheel and a single overflow discharge gate (see photos HAER WV-29-8 and 9).

The mill is equipped with Fitz Water Wheel Company (Hanover, Pennsylvania) "IXL" steel overshot wheels, set number 7741 (see photos HAER WV-29-10 and 11). [19] Although tandem water wheels were used on this site as early as 1879, neither the construction of these earlier wheels nor the installation date of the Fitz steel wheels is known. The wheel closest to the mill pond is 14 feet 8 inches in diameter and 5 feet wide. The second wheel is slightly larger, being 16 feet 2 inches in diameter and 6 feet wide (see Figure 4, Item 1).

Each wheel is connected to an external spur, master gear inside the basement of the building (see photo HAER WV-29-16) and turns a separate line shaft (Figure 4, Item 3). The smaller wheel drives a wooden main drive pulley (see photos HAER WV-29-12 and 15 and Figure 4, Item 2). A single four inch wide pulley on each line shaft permitted the cross connection of the shafts so that one wheel could power both line shafts when necessary (Figure 4, Item 4).

All of the mill's machinery was exclusively water-powered until circa 1920 when a 20 horsepower Fairbanks-Morse diesel engine (Figure 4, Item 9) was installed and connected to the line shaft with the large wooden pulley. [20] The installation of the diesel engine permitted the mill to operate even when the volume of water was insufficient to drive both wheels. A 115 volt, 38 amp, direct-current electric generator (Figure 4, Item 12) was used to supply electricity for illuminating both the mill and the miller's house and for operating two electric flour bleachers.

The Bunker Hill Mill operated until 1964, and although most of the machinery is still connected to the line shafts, the absence of the spouts between the grain elevators and machinery makes it very difficult to recreate the exact routes of the various milling processes. The arrangement of the scales, elevators, horizontal augers, and storage bins, however, makes it possible to describe the general operations of the mill during the twentieth century.

Wheat brought to the mill was unloaded at the dock (see photos HAER WV-29-6 and 7) and shoveled into one of three basement hoppers (Figure 4, Item 7). From here, elevators (Figure 4, Item 5) carried the grain to the mezzanine (attic) level above the third floor (see photos HAER WV-29-36 and 38 and Figure 8). Chutes from the mezzanine level fed the wheat to a "Monitor" receiving separator manufactured by the Huntley, Cranson and Hammond Company of Silver Creek, New York (see Figure 9 Item 2 and HAER photo WV-29-35). Using screens and sieves, the receiving separator removed the coarsest impurities, such as sticks, straw, and stones. An air blower within the separator discharged dust, chaff, light weed seeds, and sand outside of the mill. This machine was located on the third floor and had the capacity to clean approximately 500 bushels of wheat per day. A "Eureka Dustless" receiving separator currently stored in the mill's basement was most likely also originally located on the third floor. The "Eureka Dustless" was manufactured by the S. Howes Company, also of Silver Creek, New York. [21] Whether the "Eureka" separator was used simultaneously with or replaced by the "Monitor" separator is unknown.

Wheat cleaned by the receiving separator was returned to the first floor for weighing (see photo HAER W-29-26 and Figure 5, Item 13) before being elevated once again to any of four temporary storage bins on the third floor (Figure 7, Item 4). Subsequent cleaning operations prior to the actual grinding of the wheat into flour involved the use of a milling separator and a wheat scourer. The milling separator used blasts of air, suction, and multiple sieves finer than those of the receiving separator to remove oats, barley, and undersized, immature grain. The mill was equipped with two milling separators, both housed on the second floor (see photo HAER W-29-29). A "Eureka Perfected" milling separator manufactured by the S. Howes Company (photo HAER W-29-30 and Figure 6, Item 4) remains attached to the second floor line shaft. Standing unattached and most likely not in its original working position is a Barnard and Leas Manufacturing Company (Moline, Illinois) milling separator (Figure 6, Item 5). [22] Dust and chaff removed by the milling separators was expelled from the mill through an exhaust duct connected to each separator.

Adjacent to the milling separators was a "Eureka Horizontal" wheat scourer which polished the wheat, removed the fine dust and dirt still clinging to the grain, and vented these fine particles from the inside of the building (see photos HAER W-29-27 and 28 and Figure 6, Item 7). [23] After scouring, the wheat was ready for the roller mills.

A small, unidentified roller mill (see photo HAER WW-29-33 and Figure 6, Item 9) is located on the second floor; however, the bulk of the flour produced at the mill was ground by a single "Midget Marvel" rolling mill (see photo HAER WW-29-25 and Figure 5, Item 11) located on the first floor. The "Midget Marvel," manufactured by the Anglo-American Milling Company of Owensboro, Kentucky, was a small commercial mill. [24]

The "Midget Marvel," driven by a single 11 inch wide drive pulley, used corrugated reels to break apart the wheat and sieves to separate the bran from the flour (see photos HAER WW-29-21 and 25). After two passes through the break reels, follow by two passes through the reduction reels, the fine bran was separated from the flour and the flour was sifted into two or three grades. The "Midget Marvel" installed at the Bunker Hill Mill had the capacity to produce 25 barrels of flour per day. [25]

Flour produced by the "Midget Marvel" was elevated to the second floor where it was stored in any of eight small storage bins (Figure 6, Item 1). Some of the flour was then bleached in the mill's two Alsop Electric Flour Bleachers (see photo HAER WW-29-32). Bleached flour was obtained by passing a thin stream of flour through the bleacher where air and high voltage, low amperage direct-current electricity mixed to create oxide of nitrogen. Contact with the oxide of nitrogen whitened the flour. [26]

The Bunker Hill Mill contains two other pieces of flour processing machinery: a gyrating flour sifter whose manufacturer is unknown (see photo HAER WV-29-37 and Figure 7, Item 3) and a flour dresser manufactured by the Jonathan Mills Machinery Company of Cleveland, Ohio (Figure 7, Item 6). Both pieces of equipment are located on the third floor.

Corn was both ground and cracked at the mill. Cracked corn was produced by the mill's "Monarch" corn cracker (see photo HAER WV-29-34 and Figure 6, Item 6) which was manufactured by the Sprout and Waldron Company of Muncy, Pennsylvania. [27] A corn cracker manufactured by the Munson Mill Machinery Company of Utica, New York was also used but is currently lying disassembled on the second floor.

Flour ready for shipment in bags and barrels was gravity fed from the second floor storage bins to a "Monitor" automatic packing machine located on the first floor near the loading dock (see photo HAER WV-29-24 and Figure 5, Item 14). [28]

Animal feed, which the mill produced in large volume, was mixed in the "Whirlwind Feed Mixer" (see photos HAER WV-29-18 and 31 and Figure 5, Item 12 and Figure 6, Item 3). This machine was a product of the Brower Manufacturing Company of Quincy, Illinois.

Other mill machinery includes a small steel burr mill and two hammer mills. The steel burr mill, manufactured by the Wolf Company (Chambersburg, Pennsylvania) is located on the first floor (see photo HAER WV-29-23 and Figure 5, Item 10). Two "Daffin" hammer mills, all purpose high speed grain grinding machines with steel teeth, are currently stored in the basement (see photo HAER WV-29-13). The original location of these two machines is unknown.

FOOTNOTES

1. Miller, Stauffer, "The Mills of Mill Creek," The Berkeley Journal (Issue 6, 1977):13, 34-35.
2. Don C. Wood, "Abstract of Bunker Hill Mill Deeds," Berkeley County Historical Society, Martinsburg, West Virginia. (Typewritten.)
3. Ibid.
4. Miller, "The Mills of Mill Creek," p. 13.
5. Wood, "Abstract of Bunker Hill Mill Deeds."
6. "Special Schedules of Manufactures, Numbers 7 and 8, Flour and Grist Mills, Berkeley County, West Virginia," United States Census of Manufactures, 1880, West Virginia Archives, Charleston, West Virginia.
7. Ibid.
8. Ibid.
9. Wood, "Abstract of Bunker Hill Mill Deeds."
10. Ibid.
11. "Special Schedules of Manufactures, Numbers 7 and 8," United States Census of Manufactures, 1880, West Virginia Archives, Charleston, West Virginia.
12. Martinsburg Statesman, March 12, 1887; also cited in Miller, "The Mills of Mill Creek," p. 37.
13. Martinsburg Statesman, November 12, 1887; also cited in Miller, "The Mills of Mill Creek," pp. 37-39.
14. Ledger book of the Cline and Chapman Roller Mill in the possession of Paul and Janita Giles, Bunker Hill, West Virginia.
15. Miscellaneous mill papers in the possession of Paul and Janita Giles, Bunker Hill, West Virginia.
16. Martinsburg Statesman Democrat, April 5, 1907.
17. Wood, "Abstract of Bunker Hill Mill Deeds."
18. Miller, "The Mills of Mill Creek," p. 35.

19. Detailed information on "IXL" steel overshot water wheels is available in the Fitz Water Wheel Company catalogs possessed by the National Museum of American History, Smithsonian Institution, Washington, D.C.

20. The nameplate on the Fairbanks-Morse engine lists this machine as 20 horsepower, 350 rpm, Style "H", serial number 518009. A patent date of April 20, 1920 is also affixed to the engine.

21. Detailed information on Eureka receiving separators is available in the S. Howes Company catalogs possessed by the National Museum of American History, Smithsonian Institution, Washington, D.C.

22. The Eureka milling separator bears the serial number 54299. The Barnard and Leas separator is model number 153, serial number 16296. Detailed information on Eureka milling separators is available in the S. Howes Company catalogs possessed by the National Museum of American History, Smithsonian Institution, Washington, D.C.

23. The Eureka horizontal wheat scourer bears the serial number 71113 and is equipped with SKF bearings. Detailed information on Eureka wheat socourers is available in the S. Howes Company catalogs possessed by the National Museum of American History, Smithsonian Institution, Washington, D.C.

24. B. W. Dedrick, Practical Milling (Chicago: National Miller, 1924), p. 254.

25. Ibid., pp. 254-256; The Midget Marvel Rolling Mill installed in the Bunker Hill Mill bears the serial number 643 and the following patent dates: September 25, 1909, August 4, 1910, May 31, 1912.

26. The flour bleachers were manufactured by the Alsop Process Company, St. Louis, Missouri. These machines operated at 1,500 rpm using three-quarters of a kilowatt of 500 volt electricity. Information on the Alsop bleaching process is available in Peter A. Kozmin, Flour Milling (New York: Van Nostrand Company, 1921), pp. 480-482.

27. Detailed information on Monarch corn cracking and grading equipment is available in the Sprout and Waldron Company catalogs possessed by the National Museum of American History, Smithsonian Institution, Washington, D.C.

28. The Monitor flour packer was manufactured by the Huntley Manufacturing Company of Silver Creek, New York and bears a patent date of February 14, 1899.

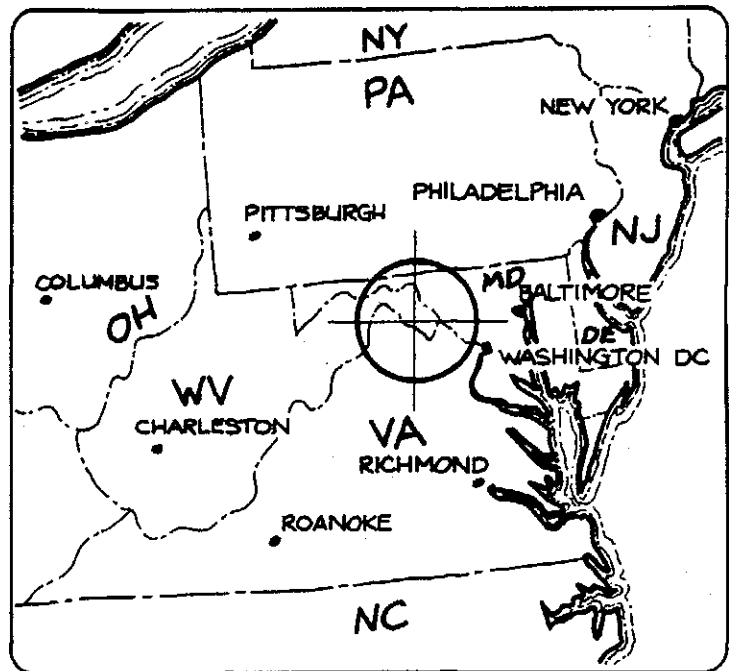


Fig. 1 Regional Map

BASED ON 1969 RAND McNALLY USA ROAD ATLAS, P. 3

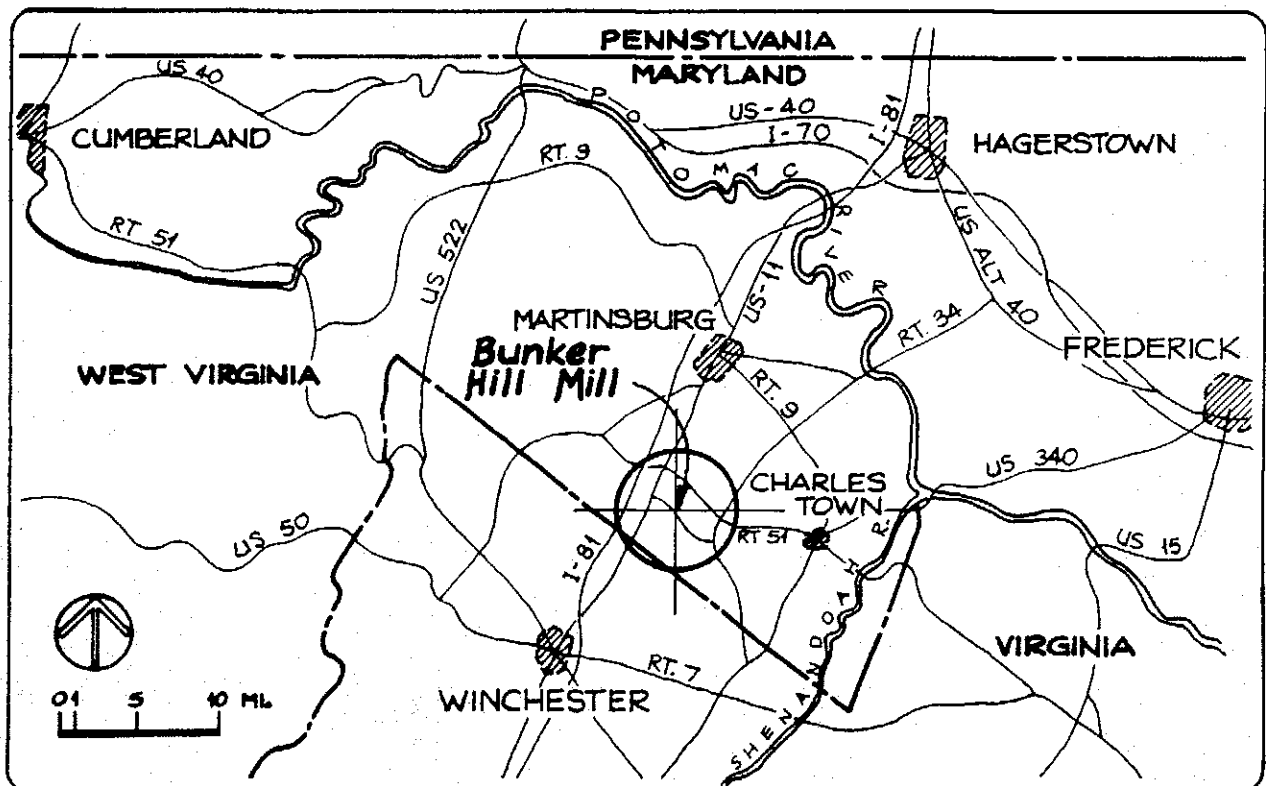


Fig. 2 Panhandle Vicinity Map

BASED ON 1976 OFFICIAL WEST VIRGINIA HIGHWAY MAP

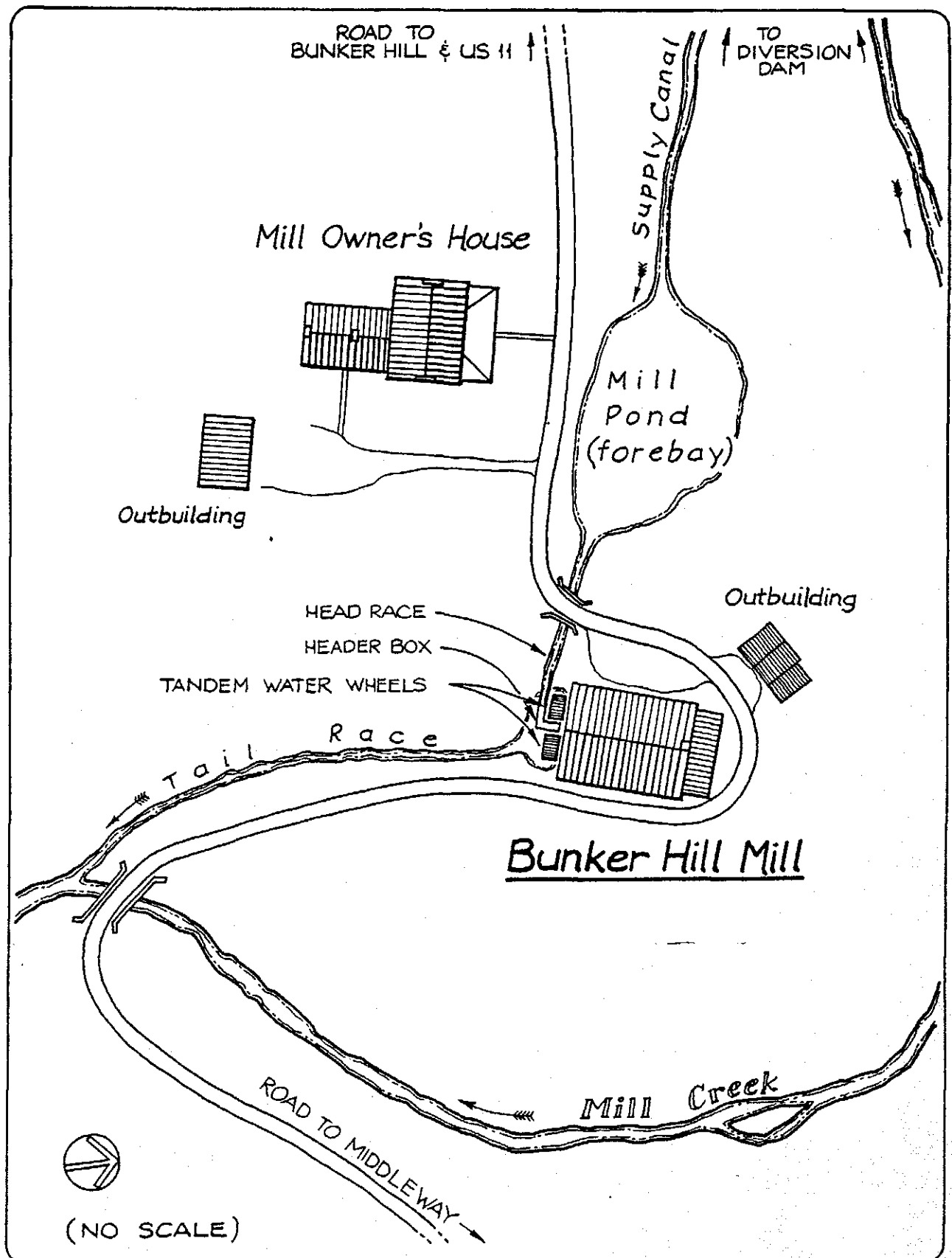
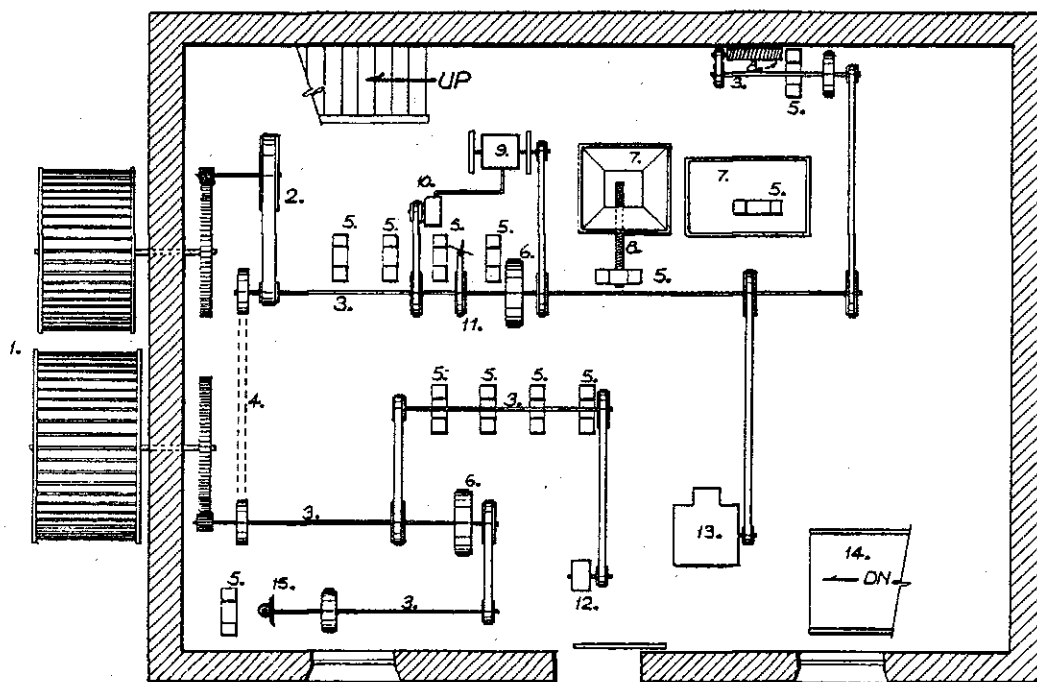


Fig. 3 Bunker Hill Mill Area Site Map



BASEMENT LEVEL

- | | |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| 1. TANDEM WATER WHEELS, BY FITZ WATER WHEEL CO., CHAMBERSBURG, PA.; 16'-2" DIA., BY 6'-0" WIDE; AND 14'-8" DIA., BY 5'-0" WIDE | 8. AUGER, MOVED GRAIN HORIZONTALLY FROM BIN OR CHUTE TO ELEVATOR |
| 2. WOODEN FLYWHEEL | 9. FAIRBANKS-MORSE DIESEL ENGINE, USED TO DRIVE LINE SHAFT WHEN WATER FLOW OVER WHEELS WAS NOT ADEQUATE |
| 3. LINE SHAFT | 10. AIR COMPRESSOR |
| 4. A BELT CONNECTING THE TWO LINE SHAFTS COULD BE INSTALLED, TO DRIVE THEM BOTH WITH ONLY ONE WATER WHEEL | 11. LINE UP TO GROUND FLOOR THAT DROVE THE SMALL BURR MILL |
| 5. ELEVATOR | 12. 115 VOLT, 38 AMP. DIRECT-CURRENT GENERATOR |
| 6. PULLEY AND BELT THAT CONNECTED TO LINE SHAFT ON THIRD FLOOR MEZZANINE TO DRIVE ELEVATORS | 13. 3000 RPM DAFFIN MACHINE |
| 7. GRAIN BIN | 14. RECEIVING CHUTE |
| | 15. BEVEL GEAR THAT ROTATED LARGE MILL-STONE ON GROUND FLOOR |

Fig. 4

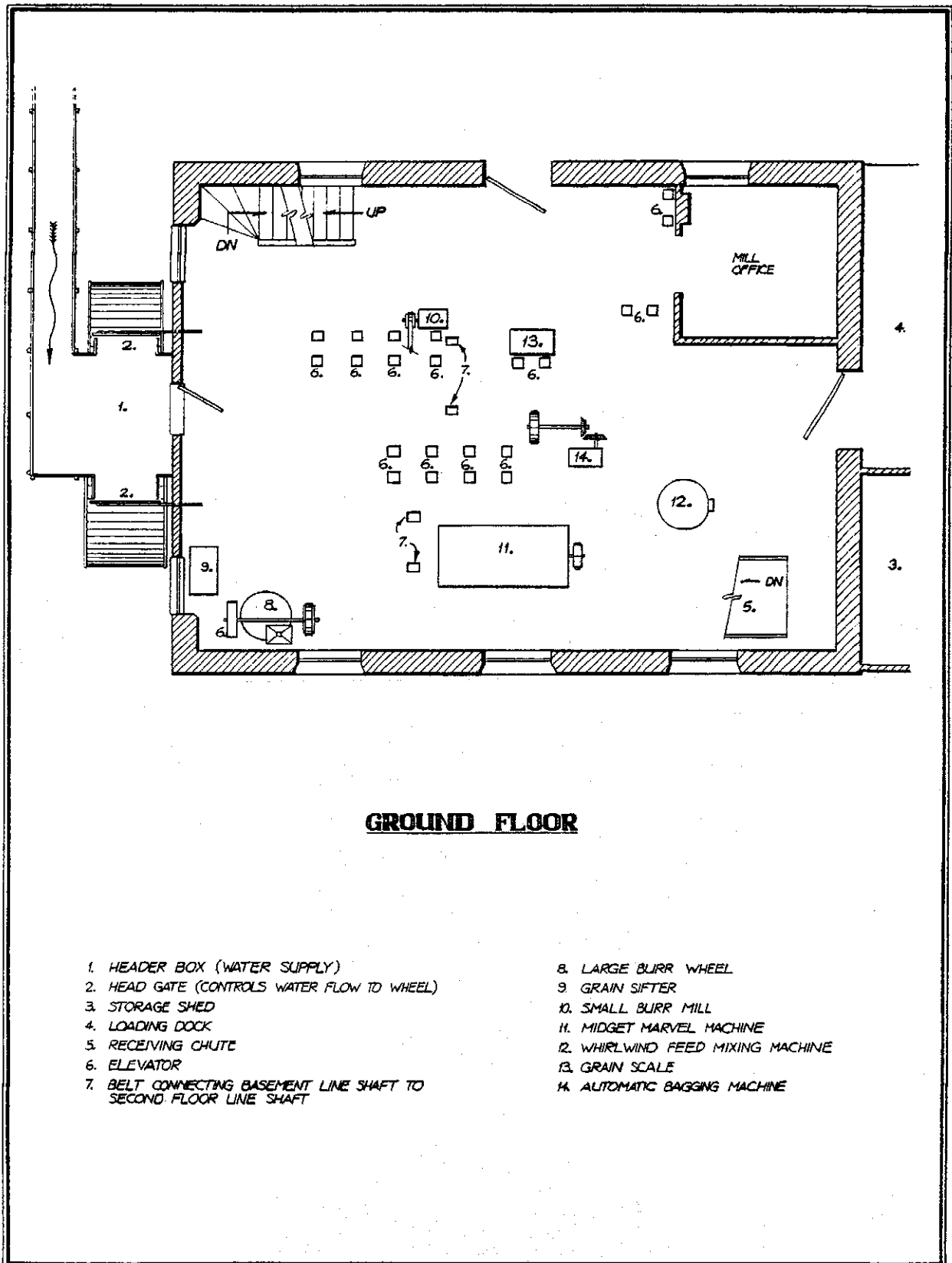
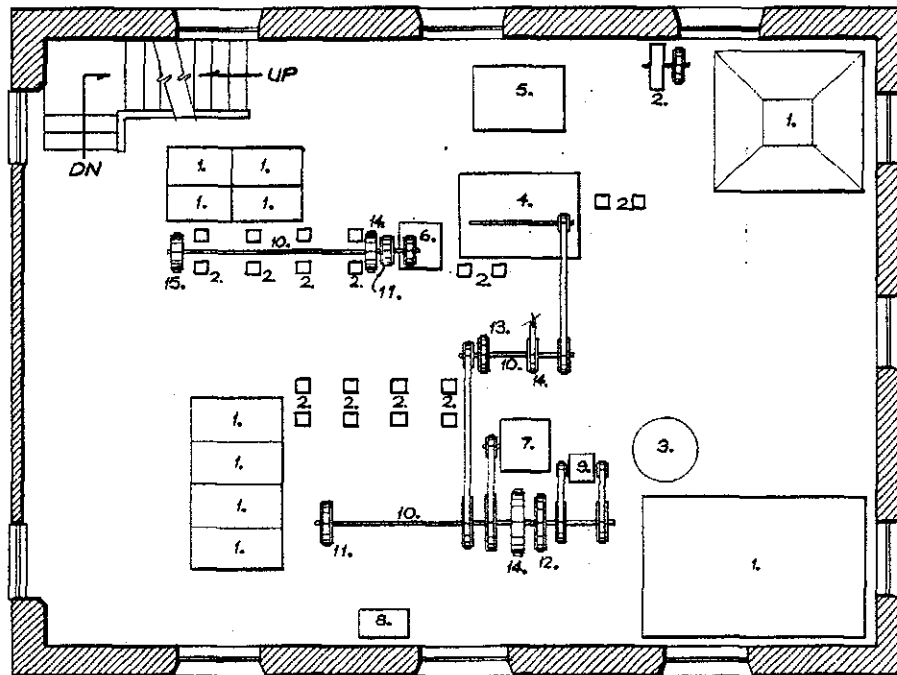


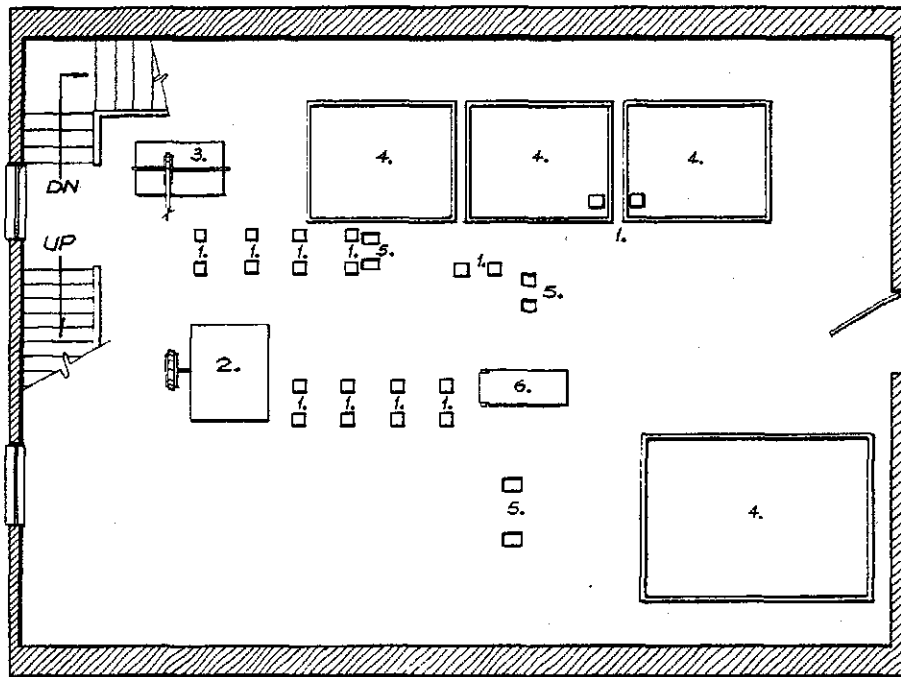
Fig. 5



SECOND FLOOR

- | | |
|----------------------------------|-----------------------------------------------|
| 1. GRAIN BIN | 8. FLOUR BLEACHER |
| 2. ELEVATOR | 9. GRAIN ROLLER |
| 3. WHIRLWIND FEED MIXING MACHINE | 10. LINE SHAFT |
| 4. MILLING SEPARATOR | 11. LINE UP FROM BASEMENT TO POWER LINE SHAFT |
| 5. OLD MILLING SEPARATOR | 12. LINE DOWN TO POWER MIDGET MARVEL |
| 6. CORN CRACKER | 13. LINE DOWN TO POWER AUTOMATIC BAGGER |
| 7. WHEAT SCOURER | 14. LINE UP TO MEZZANINE TO POWER ELEVATORS |
| | 15. LINE UP TO POWER RECEIVING SEPARATOR |

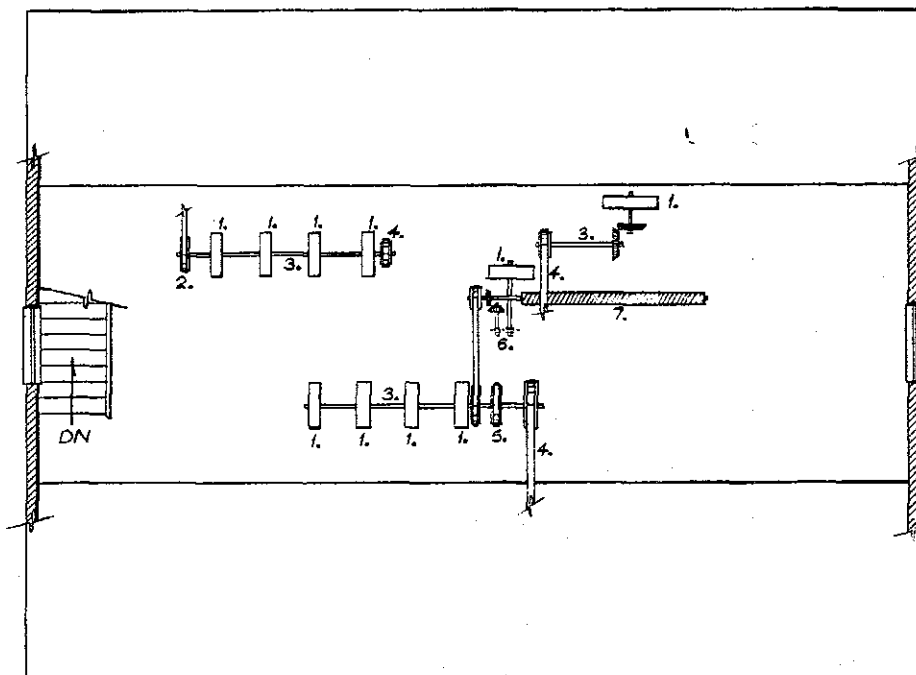
Fig. 6



THIRD FLOOR

- | | |
|-------------------------------------------------------------|----------------------------------------------------------------------|
| 1. ELEVATOR | 4. GRAIN BIN |
| 2. RECEIVING SEPARATOR - POWERED BY SECOND FLOOR LINE SHAFT | 5. BELT CONNECTING SECOND FLOOR LINE SHAFT WITH MEZZANINE LINE SHAFT |
| 3. GRAIN SIFTER - POWERED BY MEZZANINE LINE SHAFT | 6. FLOUR DRESSER - POWERED BY MEZZANINE LINE SHAFT |

Fig. 7



MEZZANINE

- | | |
|---------------------------------------------------|-------------------------------------------|
| 1. ELEVATOR | 5. LINE DOWN TO POWER FLOUR DRESSER |
| 2. LINE DOWN TO POWER GRAIN SIFTER | 6. BEVEL GEAR AND CHAIN TO POWER ELEVATOR |
| 3. LINE SHAFT | 7. AUGER, MOVED GRAIN HORIZONTALLY TO |
| 4. LINE UP FROM SECOND FLOOR TO POWER ELEVATOR(S) | BINS ON THIRD FLOOR |

Fig. 8